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**west virginia department of environmental protection**

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Jim Justice, Governor  
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**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Registration No.: R13-3335  
Plant ID No.: 061-00226  
Applicant: West Virginia University  
Facility Name: Evansdale Campus  
Location: Morgantown, Monongalia County  
NAICS Code: 611310  
Application Type: Construction  
Received Date: August 08, 2016  
Engineer Assigned: William T. Rothwell II, P.E.  
Fee Amount: \$3,500.00  
Date Received: September 20, 2016  
Complete Date: September 7, 2016  
Applicant Ad Date: August 22, 2016  
Newspaper: *The Dominion Post*  
UTM's: Easting: 588.679 km Northing: 4389.452 km Zone: 17  
Description: West Virginia University has applied for a permit for eight (8) diesel fired emergency generators that were installed for the purpose of providing back-up electrical power for critical operating functions.

**BACKGROUND DISCUSSION**

This is an after-the-fact application for eight (8) emergency generators installed for the purpose of allowing key systems to continue to operate without interruption during times of utility power outages. Bennett Tower (G3-E) 500 kW generator was installed in 1999; the Central Chiller Facility (G5-E) 250 kW generator was installed in 1992; the Coliseum (G8-E) 515 kW generator was installed in 2006; the Creative Arts Center (G9-E) 275 kW generator was installed in 2004; the Lincoln Hall (G16-E) 200 kW generator was installed in 2005; the Mountaineer Field - West (G20-E) 200 kW generator was installed in 2001; the Percival Hall (G25-E) 300 kW generator was installed in 2016; and the WVU Police Building (G31-E) 400 kW generator was installed in 1998.

The emergency generators will be operated no more than 500 hours per year and the facility will limit testing and maintenance use to 100 hours per engine per calendar year. The following Table outlines the facility/generator configuration:

Table 1: Generator Location

Emission Unit ID	Emission Unit Location	Detail Make/Model	Year Installed/ Modified	Design Capacity	Type and Date of Change	Control Device <sup>1</sup>
G3-E	Bennett Tower	1995 Onan / 500DFFB	1999	500 kW 671 bhp	After-the-Fact	None
G5-E	Central Chiller Facility	1994 Kohler / 250ROZD	1992	250 kW 336 bhp	After-the-Fact	None
G8-E	Coliseum	2005 Cummins / DFEB-5711157	2006	515 kW 691 bhp	After-the-Fact	None
G9-E	Creative Arts Center	2002 Onan / DFBF-5585380	2004	275 kW 369 bhp	After-the-Fact	None
G16-E	Lincoln Hall	2005 Kohler / 200REOZJB	2005	200 kW 268 bhp	After-the-Fact	None
G20-E	Mountaineer Field - West	1994 Kohler / 200ROZD71	2001	200 kW 268 bhp	After-the-Fact	None
G25-E	Percival Hall	2016 Caterpillar / DM7900	2016	300 kW 402 bhp	After-the-Fact	None
G31-E	WVU Police Building	1998 Cummins / 400DFCE	1998	400 kW 536 bhp	After-the-Fact	None

## SITE INSPECTION

A site inspection was deemed unnecessary by the writer at this time, however, the facilities will be placed on the emergency generator list of sources from this permitting action.

**Directions:** From I-79, take exit 155 (Star City/WVU exit). Follow US19 South, turn left onto Patteson Drive, second light turn right onto University Ave. Turn right onto Evansdale Drive, Turn right onto Rawley Lane. Physical Plant Building will be located on the right side of the road.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emission estimates for criteria pollutants were derived from the Manufacturer's supplied data. Hazardous and toxic pollutants were determined using emission factors from AP-42, 5<sup>th</sup> Edition, 1996. Emission estimates were calculated by the applicant and checked for accuracy and completeness by the writer.

West Virginia University's proposed emergency generator installation and operation (*after-the-fact*) will result in the following estimated potential to discharge controlled emissions:

Table 2: Emergency Generator Emission Summary - Criteria Pollutants

Source ID No.	Potential Emissions (lbs/hr)					Potential Emissions (tons/yr)				
	NO <sub>x</sub>	CO	VOC	SO <sub>2</sub>	PM <sub>10</sub>	NO <sub>x</sub>	CO	VOC	SO <sub>2</sub>	PM <sub>10</sub>
G3-E	15.06	1.62	0.43	5.42	0.22	3.77	0.41	0.11	1.36	0.06
G5-E	10.39	2.24	5.03	0.69	0.74	2.60	0.56	1.26	0.17	0.18
G8-E	14.91	0.58	2.25	0.94	0.76	3.73	0.14	0.56	0.24	0.19
G9-E	8.85	0.49	0.15	0.50	0.41	2.21	0.12	0.04	0.13	0.10
G16-E	8.31	1.79	4.02	0.55	0.59	2.08	0.45	1.01	0.14	0.15
G20-E	8.31	1.79	4.02	0.55	0.59	2.08	0.45	1.01	0.14	0.15
G25-E	12.47	2.69	6.04	0.83	0.89	3.12	0.67	0.40	0.21	0.22
G31-E	16.63	3.58	8.05	1.10	1.18	4.16	0.90	2.01	0.28	0.30
<b>TOTAL</b>	<b>94.93</b>	<b>14.78</b>	<b>29.99</b>	<b>10.58</b>	<b>5.38</b>	<b>23.75</b>	<b>3.7</b>	<b>6.4</b>	<b>2.67</b>	<b>1.35</b>

Table 3: Emergency Generator Emission Summary - Hazardous/Toxic Pollutants

Source	Potential Emissions (lbs/hr)						Potential Emissions (tons/yr)					
	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formal-dehyde	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formal-dehyde
G3-E	0.00159	0	0.00069	0.00049	0	0.00201	0.00040	0	0.00017	0.00012	0	0.0005
G5-E	0.00079	0	0.00035	0.00024	0	0.00101	0.00020	0	0.00009	0.00006	0	0.00023
G8-E	0.00136	0	0.00049	0.00034	0	0.00014	0.00034	0	0.00012	0.00008	0	0.00003
G9-E	0.00072	0	0.00026	0.00018	0	0.00007	0.00018	0	0.00007	0.00005	0	0.00002
G16-E	0.00053	0	0.00019	0.00013	0	0.00005	0.00013	0	0.00005	0.00003	0	0.00001
G20-E	0.00063	0	0.00028	0.00019	0	0.00081	0.00016	0	0.00007	0.00005	0	0.00020
G25-E	0.00095	0	0.00042	0.00029	0	0.00121	0.00024	0	0.00011	0.00007	0	0.00030
G31-E	0.00106	0	0.00038	0.00026	0	0.00011	0.00027	0	0.00010	0.00007	0	0.00003
<b>TOTAL</b>	<b>0.008</b>	<b>0.000</b>	<b>0.003</b>	<b>0.002</b>	<b>0.000</b>	<b>0.005</b>	<b>0.002</b>	<b>0.000</b>	<b>0.001</b>	<b>0.001</b>	<b>0.000</b>	<b>0.001</b>

## REGULATORY APPLICABILITY

PSD has no applicability to the proposed facility. The facility is subject to the following state and federal rules:

*45CSR13 Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation*

The proposed construction is subject to the requirements of 45CSR13 because there will be a potential to discharge controlled emissions in excess of 6 pph and 10 tpy of a regulated air pollutant (NO<sub>x</sub>). In addition, the proposed construction is ineligible for a General Permit and therefore requires a Rule 13 Permit to Construct. The applicant has submitted the \$3,500 application fee and published a Class I legal advertisement in *The Dominion Post* on August 22, 2016.

#### *45CSR22 Air Quality Management Fee Program*

This rule establishes a program to collect fees for certificates to operate and for permits to construct, modify or relocate sources of air pollution. Funds collected from these fees will be used to supplement the Director's budget for the purpose of maintaining an effective air quality management program.

#### *45CFR60 Subpart III—Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*

West Virginia University is subject to this subpart because one (1) engine (G25-E) was manufactured after April 1, 2006. Engine (G25-E) is EPA Tier 4F certified. Manufacturer's supplied data indicate this engines will meet its respective certification standard.

#### *40CFR63 Subpart ZZZZ—National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

West Virginia University is subject to 40CFR63 Subpart ZZZZ, because Units (G3-E, G5-E, G8-E, G9-E, G16-E, G20-E, and G31-E) are considered existing area sources of HAP's since they were constructed or installed before June 12, 2006. These Units will operate under the U.S. EPA's National Emission Standards for Hazardous Pollutants ("NESHAP") as per 40CFR63 Subpart ZZZZ. Engines operating under the NESHAP cannot use the WV DEP's General Permit for Emergency Engines and therefore, must be permitted through an individual Rule 13 Permit.

### TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

#### *Acetaldehyde:*

Acetaldehyde is mainly used as an intermediate in the synthesis of other chemicals. It is ubiquitous in the environment and may be formed in the body from the breakdown of ethanol. Acute (short-term) exposure to acetaldehyde results in effects including irritation of the eyes, skin, and respiratory tract. Symptoms of chronic (long-term) intoxication of acetaldehyde resemble those of alcoholism. Acetaldehyde is considered a probable human carcinogen (Group B2) based on inadequate human cancer studies and animal studies that have shown nasal tumors in rats and laryngeal tumors in hamsters.

#### *Benzene:*

Benzene is found in the air from emissions from burning coal and oil, gasoline service stations, and motor vehicle exhaust. Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidence of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen.

#### *Ethyl Benzene:*

Ethyl benzene is mainly used in the manufacturing of styrene. Acute (short-term) exposure to ethyl benzene in humans results in respiratory effects, such as throat irritation and chest constriction, irritation of the eyes, and neurological effects, such as dizziness. Chronic (long-term) exposure to ethyl benzene by inhalation in humans has shown conflicting results regarding its effects on the blood. Animal studies have reported effects on the blood, liver, and kidneys from chronic inhalation exposure to ethyl benzene. Limited information is available on the carcinogenic effects of ethyl benzene in humans. In a study by the National Toxicology Program (NTP), exposure to ethyl benzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. EPA has classified ethyl benzene as a Group D, not classifiable as to human carcinogenicity.

#### *Formaldehyde:*

Formaldehyde is used mainly to produce resins used in particle board products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

#### *Toluene:*

The acute toxicity of toluene is low. Toluene may cause eye, skin, and respiratory tract irritation. Short-term exposure to high concentrations of toluene (e.g., 600 ppm) may produce fatigue, dizziness, headaches, loss of coordination, nausea, and stupor; 10,000 ppm may cause death from respiratory failure. Ingestion of toluene may cause nausea and vomiting and central nervous system depression. Contact of liquid toluene with the eyes causes temporary irritation. Toluene is a skin irritant and may cause redness and pain when trapped beneath clothing or shoes; prolonged or repeated contact with toluene may result in dry and cracked skin. Because of its odor and irritant effects, toluene is regarded as having good warning properties. The chronic effects of exposure to toluene are much less severe than those of benzene. No carcinogenic effects were reported in animal studies. Equivocal results were obtained in studies to determine developmental effects in animals. Toluene was not observed to be mutagenic in standard studies.

*Xylene:*

Commercial or mixed xylene usually contains about 40-65% m-xylene and up to 20% each of o-xylene and p-xylene and ethyl benzene. Xylenes are released into the atmosphere as fugitive emissions from industrial sources, from auto exhaust, and through volatilization from their use as solvents. Acute (short-term) inhalation exposure to mixed xylenes in humans results in irritation of the eyes, nose, and throat, gastrointestinal effects, eye irritation, and neurological effects. Chronic (long-term) inhalation exposure of humans to mixed xylenes results primarily in central nervous system (CNS) effects, such as headache, dizziness, fatigue, tremors, and incoordination; respiratory, cardiovascular, and kidney effects have also been reported. EPA has classified mixed xylenes as a Group D, not classifiable as to human carcinogenicity.

AIR QUALITY IMPACT ANALYSIS

Air dispersion modeling was not performed as the source is not a 'major source' as defined under Rule 14 and Monongalia County is designated as 'in attainment' for all Regulated Pollutants.

RECOMMENDATION TO DIRECTOR

The information contained in the permit application R13-3335 indicates that compliance with all applicable state rules and federal regulations should be achieved when all proposed control methods are in operation. Therefore, the granting of a permit to West Virginia University for the installation and operation of eight (8) emergency generators at the Evansdale Campus, Morgantown, Monongalia County, WV, is hereby recommended.



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William T. Rothwell II, P.E.  
Engineer

May 4, 2017

Date